



NOAA SCIENTIFIC PUBLICATIONS REPORT

SEPTEMBER 21- OCTOBER 5, 2012

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1. HIGHLIGHTED ARTICLES

- 1a. Title:** *Resource requirements of the Pacific Leatherback turtle population*
Journal: PLoS ONE

Authors: T. Todd Jones (NMFS PIFSC), Brian L. Bostrom, Mervin D. Hastings, Kyle S. Van Houtan (NMFS PIFSC), Daniel Pauly, David R. Jones

Significance:

- Restoration of leatherback turtles to pre-1980 abundance could benefit fish populations by reducing the abundance of jellyfish, which prey directly on fish eggs and larvae.
- Jellyfish abundance is increasing in response to warming climate patterns and overfishing, which may be leading to ecosystem changes where jellyfish are replacing fish as the dominant species.

Level of controversy: Low

Summary: The Pacific population of leatherback sea turtles has drastically declined in the last 25 years, largely due to incidental capture by fisheries, egg and meat harvesting, and recently, to climate variability and resource limitation.

Leatherbacks prey on jellyfish, and if mature leatherbacks were restored levels estimated to be common two decades ago, the Pacific population would consume upwards of 61 million metric tons of jellyfish per year. To obtain this result, the authors used growth rates and feeding experiments to estimate daily food intake of leatherbacks throughout their development, then calculated population-level food intake using mortality

rates. A single leatherback will eat upward of 1000 metric tons of jellyfish in its lifetime with the Pacific population consuming 2.1 million tons of jellyfish annually. Model estimates suggest 2–7 yr-old juveniles comprise the majority of the Pacific leatherback population biomass and account for most of the jellyfish consumption.

Publication Date: Expected - October 2012, Accepted - September 12, 2012

Press release/Roll out plan: Possible press release and Twitter activity.





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2. ADDITIONAL ARTICLES

2a. Title: *Last Millennium Climate and Its Variability in CCSM4*

Journal: Journal of Climate

Authors: Laura Landrum; Bette L. Otto-Bliesner; **Eugene R. Wahl (National Climatic Data Center)**; Andrew Conley; Peter J. Lawrence; Nan Rosenbloom; Haiyan Teng (all other authors, National Center for Atmospheric Research)

Significance:

- This is the first long transient forcing run with a state-of-the-art Earth System Model at high spatial resolution (1°), covering the period CE 850-2005. The goal being a deeper understanding of forced responses, unforced variability, and dynamics of the climate system than is possible from the paleoclimate record alone.
- This simulation will act as a touchstone for evaluation of the transient characteristics of last millennium and earlier climate, including the extent to which important climate features appear to be forced or due to internal variability.
- Comparison of the model results with instrumental and paleoclimate reconstruction data indicates areas of both agreement and disagreement.
- For policy, it corroborates the scientific consensus that anthropogenic global warming and associated alterations to the climate system are real.

Summary: An overview of the Last Millennium (LM) simulation of the Community Climate System Model version 4 (CCSM4) is presented. The simulation reproduces many large scale climate patterns suggested by historical and proxy-data records, with Northern Hemisphere and Southern Hemisphere surface temperatures cooling to the early 1800's, followed by warming to present. High latitudes of both hemispheres show polar amplification of the cooling from the Medieval Climate Anomaly (MCA) to the Little Ice Age (LIA) associated with sea-ice increases. The simulation does not reproduce La Niña-like cooling in the eastern Pacific during the MCA relative to the LIA, as has been suggested by proxy reconstructions. Still, dry Medieval conditions over the southwestern and central U.S. are simulated in agreement with proxy indicators for these regions. Strong multi-decadal global cooling is associated with large volcanic eruptions and CCSM4 captures some reconstructed patterns of temperature changes over Europe and North America, but



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not those of precipitation in the Asian monsoon region. The Atlantic Multidecadal Oscillation (AMO) has higher variance at centennial periods in the LM simulation compared with the 1850 CE non transient run, suggesting a long-term Atlantic Ocean response to natural forcings. The North Atlantic Oscillation (NAO), Pacific Decadal Oscillation (PDO), and El Niño-Southern Oscillation (ENSO) variability modes show little or no change. CCSM4 does not simulate a persistent positive NAO or a prolonged period of negative PDO during the MCA, as suggested by some proxy reconstructions.

Publication Date: Expected: December 2012, Acceptance date: September 10, 2012

2b. Title: *A real-time forecast service for the ionospheric equatorial zonal electric field*

Journal: Space Weather

Authors: Manoj C. Nair and Stefan Maus (National Geophysical Data Center; CIRES)

Significance: This service will assist the space weather forecasters to predict the radio communication and navigation outages in the equatorial region.

Summary: The zonal electric field is the primary driver of two important features of the equatorial ionosphere: (1) The Equatorial Ionization Anomaly (EIA), and (2) plasma density irregularities, also known as spread-F. During propagation through the ionosphere, communication and navigation radio signals are attenuated, delayed and scattered by these ionospheric features. Prediction of the zonal electric field is therefore a key to the real-time specification of the ionosphere. We divide the zonal electric field into a climatological contribution plus the prompt-penetration contribution predicted by a transfer-function model applied to the interplanetary electric field measured by the Advanced Composition Explorer (ACE) satellite. The zonal electric field is predicted about one hour in advance, covering all local times and longitudes. The real-time prediction is available as a Google application at <http://www.geomag.us/models/PPEFM/RealtimeEF.html>. The benefit of this application to space weather forecasting is twofold: As the driver of the equatorial plasma fountain, the predicted zonal electric field is a leading indicator by 2–3 h of the EIA and the Total Electron Content (TEC) of the equatorial ionosphere. Second, rapid uplift of the ionosphere by strong eastward electric field is known to induce spread-F. Prediction of enhanced prompt penetration electric field in the eastward direction therefore enables the forecast of radio communication and navigation outages in the equatorial region.

Publication Date: September 18, 2012



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2c. Title: *Comparison of abundance and habitat usage for common bottlenose dolphins between sites exposed to differential anthropogenic stressors within the estuaries of southern Georgia, USA*

Journal: Marine Mammal Science

Authors: Brian Balmer, **Lori Schwacke** (NOS NCCOS), Randall Wells, **Jeffrey Adams** (NOS NCCOS), R. Clay George, **Suzanne Lane** (NOS NCCOS) William Mclellan, **Patricia Rosel** (NMFS SFSC), Kate Sparks, **Todd Speakman** (NOS NCCOS), **Eric Zolman** (NOS NCCOS)

Significance:

- The *Tursiops truncatus* stock within Turtle/Brunswick River Estuary has little overlap with an adjacent estuarine stock and therefore should be considered as a discrete stock.
- The relative discreteness of the TBRE stock paired with previously reported health issues and high exposure to legacy PCBs should be considered for stock management.

Summary: The health of common bottlenose dolphins (*Tursiops truncatus*) within southern Georgia estuaries is of particular concern due to high levels of anthropogenic contaminants in their tissues. Dolphins in this region have the highest polychlorinated biphenyl (PCB) concentrations recorded for any marine mammal and these concentrations correlate to distance from a Superfund point-source in the Turtle/Brunswick River Estuary (TBRE). Currently, little is known about the population structure of dolphins in this region. This study identifies and compares baseline data on abundance, habitat use, site-fidelity, and ranging patterns of dolphins across two adjacent field sites; Brunswick, including the TBRE, and Sapelo, including the Sapelo Island National Estuarine Research Reserve. Sapelo is relatively undeveloped and was selected for comparison to the more contaminated TBRE. Dolphin densities increased with tributary size in both sites but dolphin density and total abundance were significantly higher in Sapelo than in Brunswick. Anthropogenic stressors within the TBRE may be an important factor contributing to the differences in abundance, density, and habitat use observed in this study.

Publication Date: October 2012 OR January 2013



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3. OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

3a. Title: *Achieving Hazard-Resilient Coastal & Waterfront Smart Growth: Coastal & Waterfront Smart Growth & Hazard Mitigation Roundtable Report*

Authors: NOS, Office of Ocean and Coastal Resource Management (OCRM); NOS, Coastal Services Center (CSC); OAR, National Sea Grant College Program (Sea Grant), EPA: Office of Sustainable Communities

Significance:

- This roundtable helped increase the understanding of hazard-resilient smart growth and the opportunities and challenges with implementing it.
- The participants provided ideas on gaps and needs that NOAA, EPA, other federal agencies, National Sea Grant College Program partners, and other organizations could address to better integrate smart growth and hazard mitigation strategies including economic and effectiveness research; tools, technical assistance, and training; policy and funding options; communications; and coordination and collaboration.
- Together, smart growth strategies and hazard mitigation measures can offer communities tools they can use to meet their safety, economic, environmental, quality of life, and transportation goals.
- Continued work on integrating smart growth and hazard mitigation strategies will help coastal and waterfront communities achieve safe, productive places where people enjoy living and visiting.

Summary: In August 2011, NOAA, the EPA and the state Sea Grant College Programs of Hawaii, Rhode Island, and Texas hosted a two-day roundtable meeting of national experts from the fields of smart growth, hazard mitigation, climate change adaptation, and coastal management. The roundtable brought together these experts to share ideas about how coastal and waterfront communities could achieve smart growth goals while minimizing risks from natural hazards related to coastal and waterfront flooding. The report provides an overview of ideas shared during the roundtable. The report is intended to provide information on further research, product development and services, and integration of the fields for consideration by federal agencies, state partners, academics, and practitioners working on these issues.